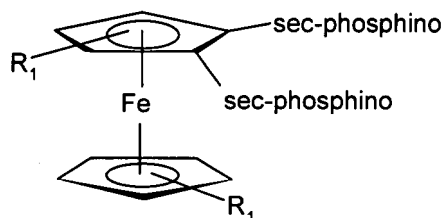


Amendments to the Claims

1. (Original) A compound of the formula I in the form of a racemate, a mixture of diastereomers or an essentially pure diastereomer,

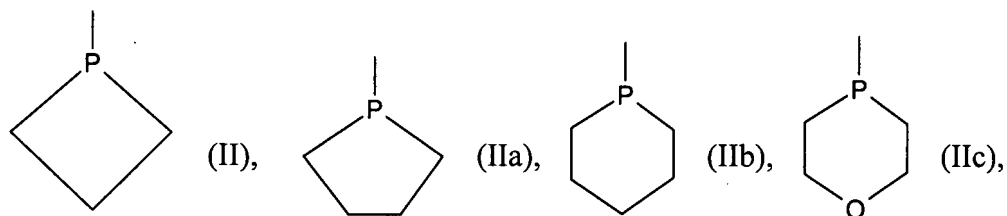


(I),

where

R₁ is a hydrogen atom or C₁-C₄-alkyl and at least one sec-phosphine group is an unsubstituted or substituted cyclic phosphino group, or a phosphonium salt thereof having one or two monovalent anions or one divalent anion.

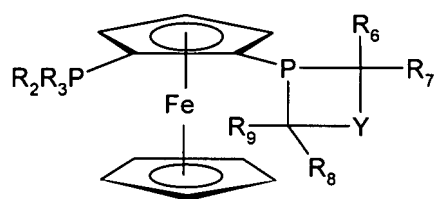
2. (Original) The compound as claimed in claim 1, wherein the cyclic sec-phosphino corresponds to the formula II, IIa, IIb or IIc,



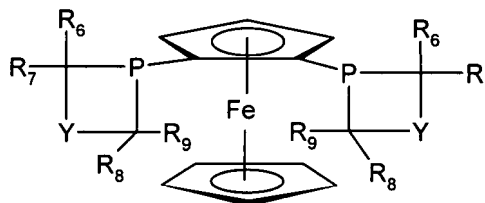
which are unsubstituted or substituted by one or more -OH, C₁-C₈-alkyl, C₄-C₈-cycloalkyl, C₁-C₆-alkoxy, C₁-C₄-alkoxy-C₁-C₄-alkyl, phenyl, C₁-C₄-alkyl- or C₁-C₄-alkoxyphenyl, benzyl, C₁-C₄-alkyl- or C₁-C₄-alkoxybenzyl, benzyloxy, C₁-C₄-alkyl- or C₁-C₄-alkoxybenzyloxy or C₁-C₄-alkylidenedioxyl groups.

3. (Original) The compound as claimed in claim 2, wherein substituents are present in one or both α positions relative to the P atom.

4. (Original) The compound as claimed in claim 1, wherein the compound of the formula I corresponds to the formula III or IV,



(III),

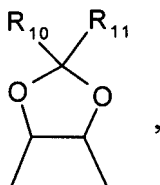


(IV),

where

R_2 and R_3 are each, independently of one another, a hydrocarbon radical which has from 1 to 20 carbon atoms and is unsubstituted or substituted by halogen, C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl, C_1 - C_6 -alkoxy, C_1 - C_6 -haloalkoxy, di- C_1 - C_4 -alkylamino, $(C_6H_5)_3Si$, $(C_1$ - C_{12} -alkyl) $_3Si$, or $-CO_2$ - C_1 - C_6 -alkyl,

Y is $-CH_2-$, $-CH_2CH_2-$, $-CH_2CH_2CH_2-$, $-CH(OH)CH(OH)-$, $-CH(OC_1-C_4\text{-alkyl})CH(OC_1-C_4\text{-alkyl})-$ or a radical of the formula



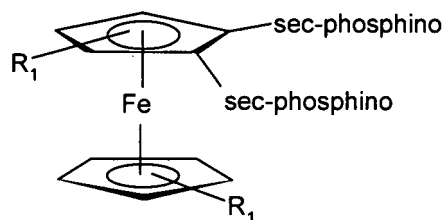
R_6 , R_7 , R_8 and R_9 are each, independently of one another, H, C_1 - C_4 -alkyl or benzyl, and at least one of the radicals R_6 , R_7 , R_8 and R_9 is C_1 - C_4 -alkyl, benzyl or $-CH_2-O-C_1-C_4\text{-alkyl}$ or

$-CH_2-O-C_6-C_{10}\text{-aryl}$,

R_{10} is H or C_1 - C_4 -alkyl and

R_{11} is C_1 - C_4 -alkyl.

5. (Currently amended) A process for preparing compounds of the formula I in the form of racemates, mixtures of diastereomers or essentially pure diastereomers,

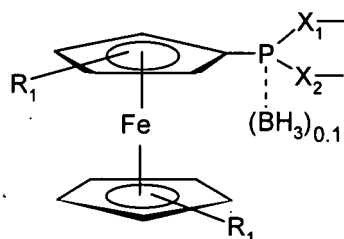


(I),

where

R_1 is a hydrogen atom or C_1 - C_4 -alkyl and at least one sec-phosphino is an unsubstituted or substituted cyclic phosphino group, which comprises the steps

a) reaction of a compound of the formula V



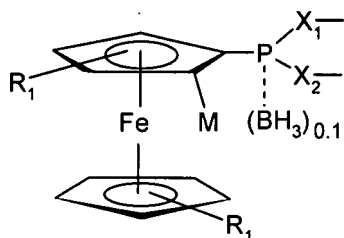
(V),

where

$(BH_3)_{0.1}$ means that the group BH_3 may be present or not be present,

X_1 and X_2 are each, independently of one another, O or N and C-bonded hydrocarbon or heterohydrocarbon radicals are bound to the free bonds of the O and N atoms,

with at least equivalent amounts of a lithium alkyl, a magnesium Grignard compound or an aliphatic Li sec-amide or X_3Mg sec-amide to form a compound of the formula VI,

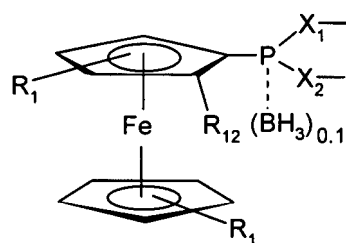


(VI),

where

M is $-Li$ or $-MgX_3$ and X_3 is Cl, Br or I,

b) reaction of the compound of the formula VI with at least equivalent amounts of a di-sec-aminophosphine halide, a dialkoxyphosphine halide, di-sec-amino-P(O) halide, dialkoxy-P(O) halide or PCl_3 or PBr_3 to form a compound of the formula VII



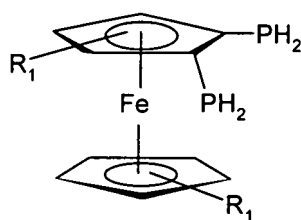
(VII),

where

R_{12} is $-PCl_2$, $-PBr_2$, di(sec-amino)P-, dialkoxyP-, di-sec-amino-P(O)-, dialkoxy-P(O)-, and

b1) removing any borane group present from a compound of the formula VII, then splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -(hetero)hydrocarbon- X_2 or di-sec-amino or dialkoxy by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-(O)PCl_2$ groups, $-(O)PBr_2$ groups, $-PCl_2$ groups or $-PBr_2$ groups to form a compound of the formula VIII or

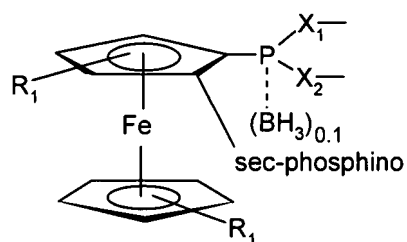
b2) splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -(hetero)hydrocarbon- X_2 or di-sec-amino or dialkoxy from a compound of the formula VII by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-(O)PCl_2$ groups, $-(O)PBr_2$ groups, $-PCl_2$ groups or $-PBr_2$ groups and then removing the borane group to form a compound of the formula VIII,



(VIII),

or

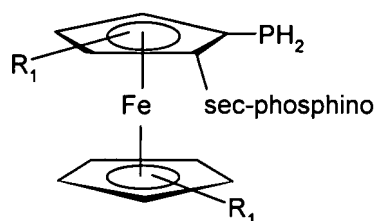
c) reaction of a compound of the formula VI with a sec-phosphine halide to form a compound of the formula IX,



(IX),

c1) removing any borane group present from a compound of the formula IX, then splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -(hetero)hydrocarbon- X_2 by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-PCl_2$ groups or $-PBr_2$ groups to form a compound of the formula X or

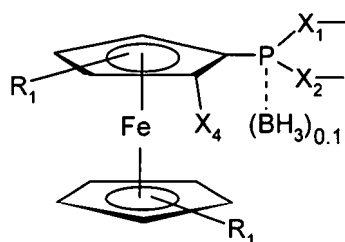
c2) splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -(hetero)hydrocarbon- X_2 from a compound of the formula IX by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-PCl_2$ groups or $-PBr_2$ groups and then removing the borane group to form a compound of the formula X



(X)

or

d) reaction of a compound of the formula VI with a halogenating reagent to form a compound of the formula XI



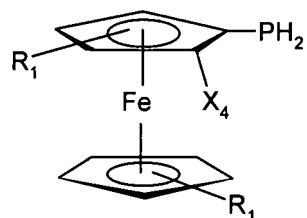
(XI),

where X_4 is Cl, Br or I,

d1) removing any borane group present from a compound of the formula XI, then splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -

(hetero)hydrocarbon- X_2 by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-PCl_2$ group or $-PBr_2$ group to form a compound of the formula XII or

d2) splitting off the radicals (hetero)hydrocarbon- X_1 , (hetero)hydrocarbon- X_2 or X_1 -(hetero)hydrocarbon- X_2 from a compound of the formula XI by means of HCl or HBr to form a $-PCl_2$ group or $-PBr_2$ group and then hydrogenating the $-PCl_2$ groups or $-PBr_2$ groups and then removing the borane group to form a compound of the formula XII



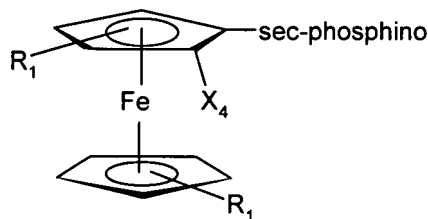
(XII)

and

d3) reacting the compound of the formula XII with a metalated sec-phosphide to form a compound of the formula X,

e) reaction of the compound of the formula VII with at least 2 equivalents and of the compound of the formula X with at least 1 equivalent of a cyclic sulfate or an open-chain disulfonate to produce compounds of the formula I in which one or both sec-phosphino groups are cyclic sec-phosphino or

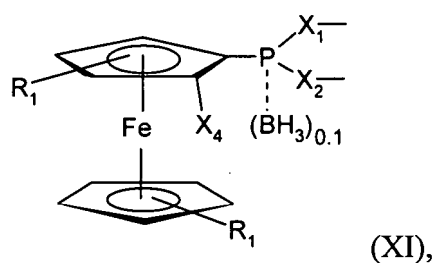
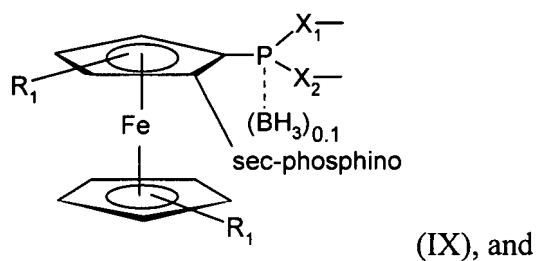
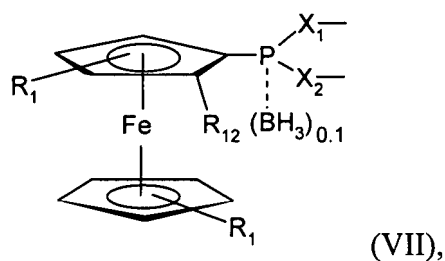
f) reaction of a compound of the formula XII with at least 1 equivalent of a cyclic sulfate or an open-chain disulfonate to produce compounds of the formula XIII,



(XIII)

where sec-phosphino is cyclic sec-phosphino which may, if appropriate, be protected by BH_3 , and then reaction of a compound of the formula XIII with at least 1 equivalent of a lithium alkyl and then with at least 1 equivalent of a sec-phosphine halide to form a compound of the formula I.

6. (Currently amended) A compound of the formula VII, IX and ~~and~~ or XI,



where

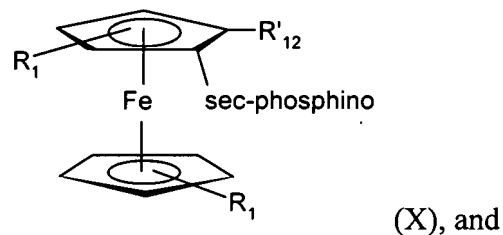
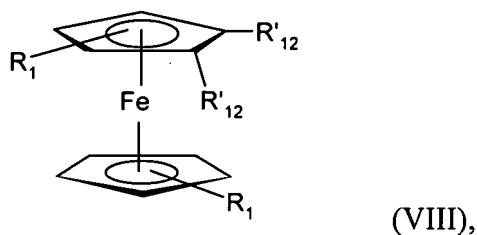
$(\text{BH}_3)_{0.1}$ means that the group BH_3 may be present or not be present,

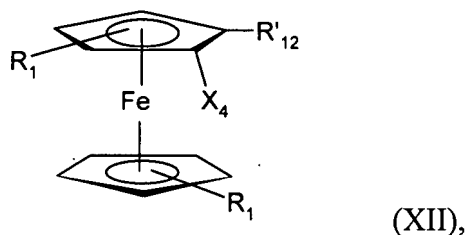
sec-phosphino is an unsubstituted or substituted cyclic phosphino group,

X_1 and X_2 are each, independently of one another, O or N and C-bonded hydrocarbon or heterohydrocarbon radicals are bound to the free bonds of the O and N atoms and

R_1 , R_{12} and X_4 are as defined in claim 5.

7. (Currently amended) A compound of the formula VIII, X or XII,



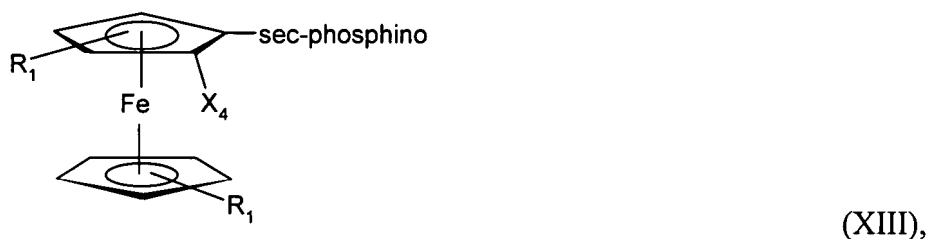


where

sec-phosphino is an unsubstituted or substituted cyclic phosphino group.

R'12 is -PCl2, -PBr2 or -PH2 and R1 and X4 are as defined in claim 5.

8. (Original) A compound of the formula XIII

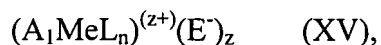


where R1 and X4 are as defined in claim 5 and sec-phosphino is cyclic sec-phosphino.

9. (Currently amended) A complex of a metal selected from the group consisting of the ~~group 8~~ transition metals Cu, Ag, Au, Ni, Co, Rh, Pd, Ir, Ru and Pt with ~~compounds~~ a compound of the formula I according to claim 1 as ligands ligand.

10. (Currently amended) The metal complex as claimed in claim 9, wherein the ~~group 8~~ transition metal is ruthenium, rhodium or iridium.

11. (Currently amended) The metal complex as claimed in claim 9, ~~characterized in that it~~ which corresponds to the formula XIV or XV,

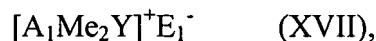
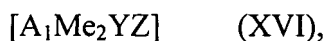


where A1 is a compound of the formula I,

L represents identical or different monodentate, anionic or nonionic ligands, or L2

represents identical or different bidentate, anionic or nonionic ligands;
 n is 2, 3 or 4 when L is a monodentate ligand or n is 1 or 2 when L is a bidentate ligand;
 z is 1, 2 or 3;
 Me is a metal selected from the group consisting of Rh, Ir and Ru; with the metal having the oxidation state 0, 1, 2, 3 or 4;
 E⁻ is the anion of an oxo acid or complex acid; and
 the anionic ligands balance the charge of the oxidation state 1, 2, 3 or 4 of the metal.

12. (Currently amended) The metal complex as claimed in claim 9, ~~characterized in that it~~ which corresponds to the formula XIII or XIV,



where

A₁ is a compound of the formula I;
 Me₂ is rhodium or iridium;
 Y represents two olefins or diene;
 Z is Cl, Br or I; and
 E₁⁻ is the anion of an oxo acid or complex acid.

13. (Cancelled)

14. (Currently amended) A process for preparing chiral organic compounds by asymmetric addition of hydrogen, boron hydrides or silanes onto a carbon-carbon or carbon-heteroatom multiple bond in prochiral organic compounds or asymmetric addition of carbon nucleophiles or amines onto allyl compounds in the presence of a catalyst, ~~characterized in that~~ wherein the addition reaction is carried out in the presence of catalytic amounts of at least one metal complex as claimed in claim 9.

15. (New) A method for preparing chiral organic compounds comprising asymmetrically adding hydrogen, boron hydrides or silanes onto a carbon-carbon or

carbon-heteroatom multiple bond in prochiral organic compounds, or asymmetrically adding carbon nucleophiles or amines onto allyl compounds, in the presence of a homogeneous catalyst, wherein the homogeneous catalyst is a complex to claim 9.